3.0 DAM OWNER'S ROLE

3.1 SAFETY PROGRAM

The dam owner is responsible for maintaining the safety of the dam. Owners should develop their own safety program which includes dam safety inspections, monitoring plans, maintenance of the structures, emergency action plans when necessary, and dam operation. A well planned safety program is directly related to the dam structure and its immediate environment and depends on the owner's knowledge of the dam and how it works. The elements of the safety program are combined to form the Dam Management and Maintenance Plan which is described in more detail in Part 2 of the Indiana Dam Safety Inspection Manual.

Developing an effective dam safety program is the single most important measure a dam owner can take to reduce the possibility or consequences of dam failure. Potential losses resulting from dam failure will continue to increase and may intensify as population growth and land development continue. Determination of liability is the legal means developed by society to recover damages due to a "wrong" (in this case, lack of dam safety) and is another aspect of the dam safety problem. A thorough understanding of this legal process can help the dam owner decide the steps to be taken to reduce liability.

Dam owners should also be financially prepared to perform necessary dam inspections, maintenance, and repairs. A reserve monetary fund that will cover the required expenses throughout the life of the dam should be established and maintained. The owner will have to make an estimate of the required annual expenditures to set up an appropriate financial mechanism.

3.2 COMPLIANCE WITH CURRENT STATE REQUIREMENTS

The dam owner is responsible for complying with all current state requirements concerning dam ownership and operation. This responsibility applies to constructing and operating new dams, existing dams, modification of existing dams and their appurtenant works, safety inspection procedures, and dam maintenance. Failure to comply with the laws can result in state-imposed fines and penalties, as well as state mandates to drawdown or remove the dam and reservoir completely. When in doubt, the dam owner should contact IDNR or obtain assistance from a qualified dam safety professional to determine the applicability of current dam safety laws (see Part 1, Chapter 1).

Ignorance of the laws is no excuse for noncompliance, and failure to follow Indiana laws will generally cost the dam owner more money than had he/she properly complied in the first place. Noncompliance may also increase the owner's potential liability costs associated with downstream damages in the event of a dam failure, especially if the noncompliance can be proven to be intentional negligence.

Although a dam can be designed and constructed to be a safe structure, lack of routine maintenance and repair, or changing conditions, can eventually cause the dam to become unsafe. If a dam is not in compliance with State law, the owner will be required to improve the dam to bring it into compliance.

3.3 REPORTING REQUIREMENTS

Under current law, the dam owner must have a professional engineer inspect high hazard dams at regular intervals and submit an inspection report to IDNR on an approved form (see Part 3). The report must include an evaluation of the dam's condition, spillway capacity, operational adequacy, and structural integrity. The report must also include a determination of whether deficiencies exist that could lead to the failure of the dam, along with recommendations for maintenance, repairs, or alterations to the structure to eliminate the deficiencies.

IDNR is currently responsible for the inspection of significant and low hazard dams at regular intervals. IDNR completes an inspection report for these dams and maintains a copy of each report in their files. However, such routine inspection by the IDNR does not absolve the dam owner of the liability and responsibility to operate and maintain a safe dam. Dam owners are encouraged to conduct independent inspections no matter what hazard classification the dam has.

The dam owner should also file a verbal or written report for any of the following incidents to their engineer as well as the IDNR as soon as they occur or as they begin to occur:

- significant changes in the dam's condition that affect dam safety, such as slides, deep sink holes, significant seepage, or piping
- unintentional releases of reservoir water resulting from a dam component failure
- an uncontrolled breach failure
- change in hazard classification due to downstream development
- intent to make major dam repairs

3.4 FINANCIAL OBLIGATIONS

Anyone who builds a new dam or owns or acquires an existing dam must be prepared to bear certain financial obligations, including:

- ongoing dam inspection and repair
- routine dam maintenance
- potential upgrades if upstream/downstream conditions or dam structure degradation so warrant
- liability insurance

Depending on the hazard classification, the current condition, and the size and type of the dam or structure, these financial obligations can be substantial expenditures. Therefore, it is very important for a prospective dam owner to fully evaluate the requirements before building or purchasing a dam. Routine dam maintenance costs may be relatively modest, but large scale repairs, or dam upgrades can cost the dam owner large amounts of money.

Insurance can provide liability and asset protection, so it is very important to dam owners, especially high hazard dam owners. The level of insurance is based on the value of the facilities at risk, potential downstream impacts, condition and age of the dam, likelihood of an incident occurring, government requirements, and the cost of available insurance. Insurance may cover liability and damage, the cost of business interruption, lost income, and worker's compensation.

3.5 SELECTION OF A QUALIFIED DAM SAFETY PROFESSIONAL

A property owner planning to construct or acquire a dam should retain the services of a registered professional engineer experienced in the design and construction of dams and spillways. It is common practice for the owner and the engineer to discuss the owner's needs, the intended purpose of the dam, and the project budget before any design work is performed. During the design process, the owner should remain in close contact with the engineer to periodically review the design and the desired project goals. Design plans that are submitted to IDNR or other agencies for permitting usually require the seal and signature of a professional engineer licensed in the state of Indiana.

The inspection of a dam requires the services of a dam safety professional with a broad range of specialized expertise. Dam safety inspections require an understanding of hydrology, hydraulics, soils, and the behavior of the materials used to construct and support the dam. The inspection should be supervised by a project engineer, who is a registered professional engineer. The project engineer will likely need specialized technical input and support from hydraulic, geotechnical, geological, structural, and mechanical engineers as well as licensed land surveyors.

Finding and hiring a registered professional engineer to design or inspect a dam can be a difficult task from the point of view of the owner. The dam owner should get feedback on the engineer's qualifications, responsiveness, experience, and ability to obtain a permit. Compared to the number of engineers in Indiana, very few have experience designing dams, performing construction inspections, and inspecting existing dams. During the period 1977-1981, 607 Corps of Engineers Phase I Reports were prepared for non-federal dams in Indiana, and the vast majority of these reports were prepared by professional engineers in private practice.

The proper way to select an engineer or inspector is by assessing their qualifications, ability to perform the work in a timely manner, and willingness to work with the owner. Selecting a professional firm by comparing cost proposals or by competitive bidding can result in selecting someone who asks the lowest fee and provides the least service;

therefore, the owner should be aware of the pitfalls of competitive bidding for professional services. While fee based competition may result in lower initial design costs, lower costs are often associated with inexperienced engineers and frequently limit the engineer's ability to conduct detailed evaluations that are necessary to develop a cost effective and innovative design. Furthermore, a low design cost often results in a significant increase in the cost of construction as well as long term costs associated with operation and maintenance of the dam.

The generally accepted procedure for selecting a qualified dam safety professional includes the following:

- define the scope of work for the project
- identify potential professional firms
- send several firms the scope of work, and request
- evaluate the proposals and conduct selected interviews
- determine which firm best meets the owners needs
- negotiate the terms of the agreement and the price

Proposals are normally requested from three or four firms and usually contain the following information:

- firm’s background and understanding of the project
- related project experience
- a work plan for the project
- qualifications of the key personnel that will be involved.

The fee for professional services should always be reasonable from the point of view of the owner and the professional firm. This is especially true because many dams are owned by people with fixed incomes and limited resources. The fee proposal that an owner will receive from a professional firm normally relates only to direct labor and administrative costs. With regard to permits, the condition of an existing dam is usually the most important factor in determining the cost of preparing a permit application. When numerous modifications are required to bring an existing dam into compliance with the law, the fees will ordinarily be higher.

A written contract should be insisted upon by the professional firm. In today's society, a handshake by the owner and the professional and reliance upon good faith simply will not do. Litigation seems to be a popular course of action and it is extremely important for understandings and agreements between the dam owner and the professional to be in writing. At a minimum, the contract should cover the following items:

- a description of services to be provided by the engineer
- a description of any services to be provided by the owner
- the fee to be paid to the firm, including payment procedure and terms
- procedures for changing the scope of services
- provisions for termination of the contract

During dam construction or repair, the owner should work closely with both the engineer and the contractor. Unforeseen site conditions are frequently uncovered that require the owner to approve design changes. The contractor's primary role is to construct or repair the dam and the appurtenant works in accordance with the plans and specifications. It is the contractor's responsibility to notify the engineer of any changes in the site conditions exposed during construction that vary from those shown on the drawings, in the specifications, or in any documents on site investigations. The contractor is responsible for making sure that the construction is conducted in a safe manner, that all state, federal and local regulations are adhered to during construction, and that the construction site is secure.

The Division of Water should be contacted before significant field changes are made to the approved plans. Once the dam has been constructed and the reservoir has filled, the engineer should certify that the dam was constructed in accordance with the design plans and submit as-built drawings to IDNR, Division of Water.

After construction, an owner assumes the role as the primary caretaker of the project. Routine inspection and maintenance allows early detection of many problems that could occur with a dam. The owner should inspect the dam often, keep records of observations and measurements and learn as much as possible about the operation and maintenance of the dam. The owner may have to, or may want to, hire a qualified dam safety professional to conduct routine safety inspections, particularly on high-hazard dams.

3.6 PERMITS

If a dam does fall under IDNR jurisdiction, a permit will be required to construct or modify the dam or its appurtenant structures. During the permit application process, IDNR will review the information provided by the dam owner for adequacy. The owner's designer is responsible for the safe design of all components of the dam and appurtenant works. IDNR has specific guidelines (see Subchapter 1.7, Part 1) that should be followed for the design and construction of the dam, and these guidelines should be adhered to by the dam owner to obtain and maintain a permit. Part of the permitting process involves public notification of the construction activities before construction begins.

Most new dams and significant dam repair work will also require erosion control plan approval before construction may begin. The Indiana Department of Environmental Management (IDEM) and the county Soil and Water Conservation District are involved with review and approval of the design and construction plans. Public notification is also required for this permitting process.

IDEM and the US Army Corps of Engineers (USACE) may also be involved with dam construction projects, and may issue permits for construction in a floodway, wetland impacts, or wetland mitigation, depending the site specific conditions.

Local permits may be required from county or city drainage boards, and from sanitary authorities, as applicable. Drainage board approval is usually required for the embankment grading plans and the modification to the county drainage patterns and stormwater discharge. Approval may also be required from county or city sanitary authorities if residences are located adjacent to the reservoir and they are on well water or septic systems. In these cases, the dam plans and calculations must demonstrate that the reservoir flood stage levels will not impact the water wells or septic systems. Local requirements may vary from one municipality to another.

The dam owner should enlist the help of a qualified dam safety professional to determine the full range of permitting requirements for the construction, repair, or upgrade of the dam. The type of permitting issues also affect the type of engineering plans and calculations that must be performed, the information that must be submitted to the agencies, and the length of time it will take before actual construction work may begin.

3.7 RECORD KEEPING

Dam project files should be compiled in a systematic format. A standardized, orderly, predetermined arrangement will facilitate the use of the files and accommodate future additions more readily. Generally, the project files will grow with time as new and additional information is added.

Dam owners should file all pertinent information in the project file, including background information, geological data, mapping, design information and plans, construction records, inspection records, monitoring data, photographs, maintenance and repair records, project correspondence, and other operational information. Table 3-1 contains a summary of the broad range of information that may be included in the project file.

The data sources for a specific dam may be in several locations, depending upon the developmental history of the project, previous file maintenance techniques, and any ownership changes.

Records for dams constructed with the Natural Resource Conservation Service (NRCS, formerly the Soil Conservation Service) or IDNR assistance may be found in the active files and archives of those agencies. If design or other engineering services were provided by other Federal agencies such as the Bureau of Reclamation (now the Water and Power Resources Service) or the U.S. Army Corps of Engineers (USACE), records may be located in the archives of those agencies. Engineering firms that have been involved with the dam should have project files concerning the work they performed.

Table 3-1
Recommended Information Database for Project Files

(1) Background Information	**Sources**
Dam owner & responsible parties	Regional & site geologic & seismic reports
Dam location	Logs of drill holes & test pits
Site topographic mapping	Geophysical exploration reports
Surface & subsurface geology	Project files & maps
Exploration techniques employed	Materials testing reports
Regional & site seismicity	USGS Quadrangle maps
Soil surveys and land use	County soil maps
Photographs	
Emergency Action Plan (if available)	
(2) Design Information	**Sources**
Material engineering properties	Design reports & calculations
Embankment design & materials	Technical record of design
Stability analysis & assumptions	IDNR project files
Structural design criteria	Field & laboratory test reports
Drainage area characteristics	Flood hydrology reports
Rainfall & stormwater runoff analysis	Hydraulic model reports
Design flood	Precipitation and runoff calculations
Reservoir flood routing analysis	Contract plans & specifications
Spillway and outlet hydraulic analysis & design	Dam breach flood routing analysis
Mechanical & electrical components	Geotechnical reports
Hazard potential classification	
(3) Construction Records	**Sources**
Construction procedures, methods & control	Construction specifications
Quality control test procedures & results	Daily construction inspection reports
Foundation surface characteristics & treatment	Construction progress record
Abutment surface & treatment	Quality control testing reports
Subsurface treatment & drainage control	Foundation acceptance reports
Design-related changes	Project correspondence
Final configuration of dam & foundation	As-constructed drawings & photographs
Extraordinary events during construction	Instrumentation installation reports
(4) Operational Performance Records	**Sources**
Inspection Reports	Previous operation & maintenance reports
Post-construction record floods & seismic activity	Previous inspection reports
Hydraulic performance of spillway & outlet	Special inspection reports
Structural behavior of embankment & foundation	Instrumentation records
Water retention behavior of embankment & foundation	Design operating criteria
Chronological reservoir stages	Standard operating procedures & manuals
Noteworthy spillway & outlet discharges	Materials testing reports
Repairs, alterations or modifications & reasons	Regional & site maps showing access routes
Materials deterioration descriptions	IDNR project files
Layout & performance of surveillance instrumentation	Dam owner's project files
Original instrumentation design assumptions	
Access route to the dam, spillway & outlet	
Maintenance records	
Operating procedures & records	